AMENDMENTS TO THE SPECIFICATION:

Please amend the Title of the Invention as follows:

OPTICAL DISK DRIVE HAVING GAIN CONTROL TO MAINTAIN STABILITY OF A SERVO SYSTEM

Please amend the paragraph beginning on line 10 of page 5 as follows:

Furthermore, in the writing operation on the CD-RW disk, because it is necessary to servo-control the optical pickup on the basis of the detection signal of the reflected light from the disk at the erasing power of the laser, an offset adjustment value for writing is required aside from an offset adjustment value for reading during which the optical pickup is servo-controlled with the detection signal of the reflected light from the disk at the reading power. Moreover, in the push-pull method as the tracking error signal generation method, since an optical offset may occur due to deviation of the optical axis of the photodetector as a light-receptive element, an offset adjustment value for writing must be obtained considering the optical offset.

Please amend the paragraph beginning on line 22 of page 5 as follows:

The present invention is made in view of the above-mentioned situation and has for its object to provide an optical disk drive which can quickly perform gain control ~~speedily~~ to maintain the stability of the servo system, even when the gain of the servo system changes significantly when performing writing on the optical disk.

Please amend the paragraph beginning on line 4 of page 6 as follows:

The present invention is made to achieve the above-described object, and an optical disk drive according to ~~Claim 1~~ a first aspect of the present invention comprises an optical pickup for emitting a laser to an optical disk as a recording medium, and signal-processing a reflected light from the optical disk; a servo error signal generation means for generating a servo error signal of a focusing and tracking servo system from the reflected light; an offset detection means for detecting

an offset which occurs in the servo error signal due to defocusing or detracking of an objective lens in the optical pickup, and obtaining an offset adjustment value for canceling the offset; an offset adjustment means for adding the offset adjustment value to the servo system to cancel the offset of the servo system which is detected by the offset detection means; a gain adjustment means for adjusting the gain of the servo system; a laser power switching means for changing the power of the laser emitted from the optical pickup; a command means for outputting an offset adjustment command, a gain adjustment command, and a laser power switching command to the offset adjustment means, the gain adjustment means, and the laser power adjustment means, respectively; a storage means for holding an offset adjustment value, a gain adjustment value, and a laser power, which are to be set in the offset adjustment means, the gain adjustment means, and the laser power adjustment means, respectively; and a driving means for receiving the servo error signal, and outputting a driving signal for controlling the optical pickup; wherein a first gain adjustment value and a first offset adjustment value to be set in the servo system are stored in the storage means, when the laser power emitted from the optical pickup is a first laser power; and the optical disk drive is characterized by that a second gain adjustment value to be set in the servo system when a second laser power is emitted from the optical pickup is obtained by arithmetic operation on the basis of the first gain adjustment value, the second gain adjustment value is set in the gain adjustment means, and a second offset adjustment value for canceling an offset which occurs in the servo system is obtained, and then, the second laser power, gain adjustment value, and offset adjustment value are stored in the storage means, and when the first laser power is switched to the second laser power during the actual operation, the switching of the laser power and the switching from the first gain adjustment value and offset adjustment value to the second gain adjustment value and offset adjustment value are carried out simultaneously.

Please amend the paragraph beginning on line 21 of page 7 as follows:

According to ~~Claim 2~~ a second aspect of the present invention, in the optical disk drive defined in ~~Claim 1~~ in the first aspect, the second gain adjustment value is in proportion to the reciprocal of the ratio of the second laser power when the first laser power is used as the reference.

Please amend the paragraph beginning on line 1 of page 8 as follows:

According to ~~Claim 3~~ a third aspect of the present invention, in the optical disk drive defined in ~~Claim 1~~ in the first aspect, the first laser power is a laser power at a reading level, and the second laser power is a laser power at an erasing level.

Please amend the paragraph beginning on line 5 of page 8 as follows:

According to ~~Claim 4~~ a fourth aspect of the present invention, an optical disk drive comprises an optical pickup for emitting a laser to an optical disk as a recording medium, and signal-processing a reflected light from the optical disk; a servo error signal generation means for generating a servo error signal of a focusing and tracking servo system from the reflected light; an offset detection means for detecting an offset which occurs in the servo error signal due to defocusing or detracking of an objective lens in the optical pickup, and obtaining an offset adjustment value for canceling the offset; an offset adjustment means for adding the offset adjustment value to the servo system to cancel the offset of the servo system which is detected by the offset detection means; a gain adjustment means for adjusting the gain of the servo system; a laser power switching means for changing the power of the laser emitted from the optical pickup; a command means for outputting an offset adjustment command, a gain adjustment command, and a laser power switching command to the offset adjustment means, the gain adjustment means, and the laser power switching means, respectively; a storage means for holding an offset adjustment value, a gain adjustment value, and a laser power, which are to be set in the offset adjustment means, the gain adjustment means, and the laser power switching means, respectively; and a driving means for receiving the servo error signal, and outputting a driving signal for controlling the optical pickup; wherein a first gain adjustment value and a first offset adjustment value to be set in the servo system are stored in a first storage area provided in the storage means, when the laser power emitted from the optical pickup is a first laser power; and the optical disk drive is characterized ~~by~~ in that, after the first gain adjustment value and offset adjustment value obtained by the adjustment operation are stored in the first storage area, the command means outputs a command for turning off the laser

output from the optical pickup to the laser power switching means and, after the laser output is turned off, second to m-th (m: integer not less than 2) gain adjustment values to be set in the servo system when second to m-th laser powers are emitted from the optical pickup are obtained by arithmetic operation based on the first gain adjustment value, and the second to m-th gain adjustment values are set in the gain adjustment means, and then, second to m-th offset adjustment values for canceling offsets that occur in the servo system are obtained, and the second to m-th laser powers, gain adjustment values, and offset adjustment values are stored in second to m-th storage areas provided in the storage means, respectively, and, during the actual operation, when the laser power is switched from the first laser power to an n-th (n: integer not less than 2 and not larger than m) laser power among the second to m-th laser powers, the switching of the laser power and the switching of the first gain adjustment value and offset adjustment value to the n-th gain adjustment value and offset adjustment value are carried out simultaneously.

Please amend the paragraph beginning on line 6 of page 10 as follows:

According to ~~Claim 5~~ a fifth aspect of the present invention, in the optical disk drive defined in ~~Claim 4~~ the fourth aspect, the second to m-th gain adjustment values are in proportion to the reciprocals of the ratios of the second to m-th laser powers when the first laser power is used as the reference.

Please amend the paragraph beginning on line 11 of page 10 as follows:

According to ~~Claim 6~~ a sixth aspect of the present invention, in the optical disk drive defined in ~~Claim 4~~ the fourth aspect, the first laser power is a laser power at a reading level, and the second to m-th (m: integer not less than 2) laser powers are laser powers at erasing levels.

Please amend the paragraph beginning on line 16 of page 10 as follows:

According to ~~Claim 7~~ a seventh aspect of the present invention, an optical disk drive comprises an optical pickup for emitting a laser to an optical disk as a recording medium, and signal-processing a reflected light from the optical disk; a tracking error signal generation means for

generating a tracking error signal of a tracking servo from the reflected light; an offset detection means for detecting an offset which occurs in the tracking error signal due to detracking of an objective lens in the optical pickup or deviation of the optical axis of a photodetector, and obtaining an offset adjustment value for canceling the offset; first and second offset adjustment means for adding two offset adjustment values to the tracking error signal to cancel the offset of the tracking error signal which is detected by the offset detection means; a gain adjustment means for adjusting the gain of the tracking servo; a laser power switching means for changing the power of the laser emitted from the optical pickup; a command means for outputting an offset adjustment command, a gain adjustment command, and a laser power switching command to the first and second offset adjustment means, the gain adjustment means, and the laser power switching means, respectively; a storage means for holding two offset adjustment values, a gain adjustment value, and a laser power, which are to be set in the first and second offset adjustment means, the gain adjustment means, and the laser power switching means, respectively; and a driving means for receiving the tracking error signal, and outputting a driving signal for controlling the optical pickup; wherein the offset adjustment and gain adjustment of the tracking servo are carried out after the focusing is turned on in the state where a first laser power is set in the laser power switching means, and the first offset adjustment value, gain adjustment value, and laser power which are set by the above-described adjustments are stored as first adjustment values in a first storage area provided in the storage means; and the optical disk drive is characterized ~~by~~ in that, after the first adjustment values obtained by the adjustment operation are stored in the first storage area, the command means outputs a command for turning off the laser output to the laser power switching means and, after the laser output is turned off, second to m-th gain adjustment values to be set in the servo system when second to m-th (m: integer not less than 2) laser powers are emitted from the optical pickup are obtained by arithmetic operation based on the first gain adjustment value, and the second to m-th gain adjustment values are set in the gain adjustment means, and then, second to m-th offset adjustment values for canceling offsets that occur in the servo system are obtained, and the second to m-th laser powers, gain adjustment values, and offset adjustment values are stored in second to m-th storage areas provided in the storage means, respectively, and, during the actual operation,

when the laser power is switched from the first laser power to an n-th laser power among the second to m-th laser powers, the first offset adjustment value and the n-th offset adjustment value are set in the first offset adjustment means and the second offset adjustment means, respectively, simultaneously with the switching of the laser power from the first laser power to the n-th laser power.

Please amend the paragraph beginning on line 21 of page 12 as follows:

According to ~~Claim 8~~ an eighth aspect of the present invention, in the optical disk drive defined in ~~Claim 7~~ the seventh aspect, a tracking error signal generation method employed by the tracking error signal generation mans is a push-pull method.

Please amend the paragraph beginning on line 25 of page 12 as follows:

According to ~~Claim 9~~ a ninth aspect of the present invention, in the optical disk drive defined in ~~Claim 7~~ the seventh aspect, the first laser power is a laser power at a reading level, and the second to m-th laser powers are laser powers at erasing levels.

Please amend the paragraph beginning on line 4 of page 13 as follows:

As described above, the optical disk drive according to ~~Claim 1~~ the first aspect comprises an optical pickup for emitting a laser to an optical disk as a recording medium, and signal-processing a reflected light from the optical disk; a servo error signal generation means for generating a servo error signal of a focusing and tracking servo system from the reflected light; an offset detection means for detecting an offset which occurs in the servo error signal due to defocusing or detracking of an objective lens in the optical pickup, and obtaining an offset adjustment value for canceling the offset; an offset adjustment means for adding the offset adjustment value to the servo system to cancel the offset of the servo system which is detected by the offset detection means; a gain adjustment means for adjusting the gain of the servo system; a laser power switching means for changing the power of the laser emitted from the optical pickup; a command means for outputting an offset adjustment command, a gain adjustment command, and a laser power switching command

to the offset adjustment means, the gain adjustment means, and the laser power adjustment means, respectively; a storage means for holding an offset adjustment value, a gain adjustment value, and a laser power, which are to be set in the offset adjustment means, the gain adjustment means, and the laser power adjustment means, respectively; and a driving means for receiving the servo error signal, and outputting a driving signal for controlling the optical pickup; wherein a first gain adjustment value and a first offset adjustment value to be set in the servo system are stored in the storage means, when the laser power emitted from the optical pickup is a first laser power; and the optical disk drive is characterized by that a second gain adjustment value to be set in the servo system when a second laser power is emitted from the optical pickup is obtained by arithmetic operation on the basis of the first gain adjustment value, the second gain adjustment value is set in the gain adjustment means, and a second offset adjustment value for canceling an offset which occurs in the servo system is obtained, and then, the second laser power, gain adjustment value, and offset adjustment value are stored in the storage means, and when the first laser power is switched to the second laser power during the actual operation, the switching of the laser power and the switching from the first gain adjustment value and offset adjustment value to the second gain adjustment value and offset adjustment value are carried out simultaneously. Therefore, the servo error signal offset adjustment and the gain adjustment can be carried out simultaneously with the switching of the output from the optical pickup, whereby malfunctions of the servo system due to a response delay in the gain adjustment after the laser power change are avoided, resulting in an optical disk drive with stable operation.

Please amend the paragraph beginning on line 1 of page 15 as follows:

According to ~~Claim 3~~ the third aspect of the present invention, in the optical disk drive defined in ~~Claim 1~~ the first aspect, the first laser power is a laser power at a reading level, and the second laser power is a laser power at an erasing level. Therefore, for example, when the optical disk drive shifts from the optical disk reading state to the writing operation, the servo error signal offset adjustment and the gain adjustment can be carried out simultaneously with the switching of the output from the optical pickup, whereby malfunctions of the servo system due to a response

delay in the gain adjustment after the laser power change are avoided, resulting in an optical disk drive with stable operation.

Please amend the paragraph beginning on line 13 of page 15 as follows:

According to ~~Claim 4~~ the fourth aspect of the present invention, an optical disk drive comprises an optical pickup for emitting a laser to an optical disk as a recording medium, and signal-processing a reflected light from the optical disk; a servo error signal generation means for generating a servo error signal of a focusing and tracking servo system from the reflected light; an offset detection means for detecting an offset which occurs in the servo error signal due to defocusing or detracking of an objective lens in the optical pickup, and obtaining an offset adjustment value for canceling the offset; an offset adjustment means for adding the offset adjustment value to the servo system to cancel the offset of the servo system which is detected by the offset detection means; a gain adjustment means for adjusting the gain of the servo system; a laser power switching means for changing the power of the laser emitted from the optical pickup; a command means for outputting an offset adjustment command, a gain adjustment command, and a laser power switching command to the offset adjustment means, the gain adjustment means, and the laser power switching means, respectively; a storage means for holding an offset adjustment value, a gain adjustment value, and a laser power, which are to be set in the offset adjustment means, the gain adjustment means, and the laser power switching means, respectively; and a driving means for receiving the servo error signal, and outputting a driving signal for controlling the optical pickup; wherein a first gain adjustment value and a first offset adjustment value to be set in the servo system are stored in a first storage area provided in the storage means, when the laser power emitted from the optical pickup is a first laser power; and the optical disk drive is characterized ~~by~~ in that, after the first gain adjustment value and offset adjustment value obtained by the adjustment operation are stored in the first storage area, the command means outputs a command for turning off the laser output from the optical pickup to the laser power switching means and, after the laser output is turned off, second to m-th (m: integer not less than 2) gain adjustment values to be set in the servo system when second to m-th laser powers are emitted from the optical pickup are obtained by

arithmetic operation based on the first gain adjustment value, and the second to m-th gain adjustment values are set in the gain adjustment means, and then, second to m-th offset adjustment values for canceling offsets that occur in the servo system are obtained, and the second to m-th laser powers, gain adjustment values, and offset adjustment values are stored in second to m-th storage areas provided in the storage means, respectively, and, during the actual operation, when the laser power is switched from the first laser power to an n-th (n: integer not less than 2 and not larger than m) laser power among the second to m-th laser powers, the switching of the laser power and the switching of the first gain adjustment value and offset adjustment value to the n-th gain adjustment value and offset adjustment value are carried out simultaneously. Therefore, the servo error signal offset adjustment and the gain adjustment can be carried out simultaneously with the switching of the output from the optical pickup, whereby malfunctions of the servo system due to a response delay in the gain adjustment after the laser power change are avoided, resulting in an optical disk drive with stable operation. Further, since the gain adjustment values of the second to m-th laser powers are obtained while the laser from the optical pickup is turned off, there is no fear of destruction of the data on the disk even when the second to m-th laser powers are laser powers in the erasing state.

Please amend the paragraph beginning on line 24 of page 17 as follows:

According to ~~Claim 6~~ the sixth aspect of the present invention, in the optical disk drive defined in ~~Claim 4~~ the fourth aspect, the first laser power is a laser power at a reading level, and the second to m-th (m: integer not less than 2) laser powers are laser powers at erasing levels. Therefore, when the optical disk drive shifts from the optical disk reading state to the writing operation, the servo error signal offset adjustment and the gain adjustment can be carried out simultaneously with the switching of the output from the optical pickup, whereby malfunctions of the servo system due to a response delay in the gain adjustment after the laser power change are avoided, resulting in an optical disk drive with stable operation.

Please amend the paragraph beginning on line 11 of page 18 as follows:

According to ~~Claim 7~~ the seventh aspect of the present invention, an optical disk drive comprises an optical pickup for emitting a laser to an optical disk as a recording medium, and signal-processing a reflected light from the optical disk; a tracking error signal generation means for generating a tracking error signal of a tracking servo from the reflected light; an offset detection means for detecting an offset which occurs in the tracking error signal due to detracking of an objective lens in the optical pickup or deviation of the optical axis of a photodetector, and obtaining an offset adjustment value for canceling the offset; first and second offset adjustment means for adding two offset adjustment values to the tracking error signal to cancel the offset of the tracking error signal which is detected by the offset detection means; a gain adjustment means for adjusting the gain of the tracking servo; a laser power switching means for changing the power of the laser emitted from the optical pickup; a command means for outputting an offset adjustment command, a gain adjustment command, and a laser power switching command to the first and second offset adjustment means, the gain adjustment means, and the laser power switching means, respectively; a storage means for holding two offset adjustment values, a gain adjustment value, and a laser power, which are to be set in the first and second offset adjustment means, the gain adjustment means, and the laser power switching means, respectively; and a driving means for receiving the tracking error signal, and outputting a driving signal for controlling the optical pickup; wherein the offset adjustment and gain adjustment of the tracking servo are carried out after the focusing is turned on in the state where a first laser power is set in the laser power switching means, and the first offset adjustment value, gain adjustment value, and laser power which are set by the above-described adjustments are stored as first adjustment values in a first storage area provided in the storage means; and the optical disk drive is characterized ~~by~~ in that, after the first adjustment values obtained by the adjustment operation are stored in the first storage area, the command means outputs a command for turning off the laser output to the laser power switching means and, after the laser output is turned off, second to m-th gain adjustment values to be set in the servo system when second to m-th (m: integer not less than 2) laser powers are emitted from the optical pickup are obtained by arithmetic operation based on the first gain adjustment value, and the second to m-th

gain adjustment values are set in the gain adjustment means, and then, second to m-th offset adjustment values for canceling offsets that occur in the servo system are obtained, and the second to m-th laser powers, gain adjustment values, and offset adjustment values are stored in second to m-th storage areas provided in the storage means, respectively, and, during the actual operation, when the laser power is switched from the first laser power to an n-th laser power among the second to m-th laser powers, the first offset adjustment value and the n-th offset adjustment value are set in the first offset adjustment means and the second offset adjustment means, respectively, simultaneously with the switching of the laser power from the first laser power to the n-th laser power. Therefore, an optical offset, which occurs in the tracking error signal due to a deviation of the optical axis of the optical pickup or the like, can be canceled. Accordingly, even when the gain of the servo system changes significantly due to the switching of the laser power of the optical pickup from the first laser power to the n-th laser power, the offset can be canceled with reliability, resulting in an optical disk drive with stable operation. Furthermore, since the gain adjustment values of the second to m-th laser powers are obtained while the laser from the optical pickup is turned off, there is no fear of destruction of the data on the disk even when the second to m-th laser powers are laser powers in the erasing state.

Please amend the paragraph beginning on line 2 of page 21 as follows:

According to ~~Claim 9~~ the ninth aspect of the present invention, in the optical disk drive defined in ~~Claim 7~~ the seventh aspect, the first laser power is a laser power at a reading level, and the second to m-th laser powers are laser powers at erasing levels. Therefore, for example, when the laser power is changed from the first laser power to the n-th laser power among the second to m-th laser powers due to the state change of the optical disk from the reading state to the writing state, even if an optical offset occurs in the tracking error signal due to a deviation of the optical axis of the optical pickup or the like, appropriate offset adjustment can be carried out. Accordingly, even when the gain of the servo system changes significantly due to the change of the laser power from the first laser power to the n-th laser power, the offset can be canceled with reliability, resulting in an optical disk drive with stable operation.

Please amend the paragraph beginning on line 25 of page 21 as follows:

~~Figure 3 is a diagram~~ Figures 3(a)-3(c) are diagrams illustrating a detection signal of a reflected light from a disk at writing of a CD-R disk, and a signal obtained by sampling and holding the detection signal, for servo control.

Please amend the paragraph beginning on line 4 of page 22 as follows:

~~Figure 4 is a diagram~~ Figures 4(a)-4(c) are diagrams illustrating a detection signal of a reflected light from a disk at writing of a CD-RW disk, and a signal obtained by sampling and holding the detection signal, for servo control.

Please amend the paragraph beginning on line 9 of page 23 as follows:

Hereinafter, a description will be given of an embodiment of the present ~~invention, which is defined in Claims 1 to 3 of the present invention.~~ invention.

Please amend the paragraph beginning on line 24 of page 26 as follows:

~~Figures 3 and 4~~ Figures 3(a)-3(c) and 4(a)-4(c) show a difference in servo operations at writing between a CD-R disk and a CD-RW disk, in the optical disk drive according to the present invention.

Please amend the paragraph beginning on line 6 of page 30 as follows:

Hereinafter, an embodiment of the present invention~~, which is defined in Claims 4 to 6 of the present invention,~~ will be described. Figure 5 is a block diagram illustrating the construction of an optical disk drive according to a second embodiment of the present invention. In figure 5, the same reference numerals as those shown in figure 1 designate the same or corresponding parts and, therefore, descriptions thereof will be omitted. Figure 6 is a flowchart for explaining offset adjustment by the optical disk drive according to the present invention.

Please amend the paragraph beginning on line 23 of page 34 as follows:

Hereinafter, an embodiment of the present invention ~~which is defined in Claims 7 to 9 of the present invention~~ will be described. Figure 7 is a block diagram illustrating the construction of an optical disk drive according to a third embodiment of the present invention. In figure 7, the same reference numerals as those shown in figure 5 denote the same or corresponding parts, and descriptions thereof will be omitted.

Please amend the paragraph beginning on line 23 of page 38 as follows:

After obtaining the second to fifth gain adjustment values Ge2~Ge5, the CPU 11 sets the first to fifth gain adjustment values Ge2~Ge5 successively in the gain adjustment unit 8. At this time, assuming that the second to fifth gain adjustment values have the relationship, Ge2 < Ge3 < Ge4 < Ge5, there occurs an increase in the offset which provides the relationship, Ofe2 < Ofe3 < Ofe4 < Ofe5, with reference to the Voffread as the gain adjustment value increases, as shown in figure 10. The Voffread is an offset which is caused by ~~that~~ the first offset adjustment value Ofr from the first offset adjustment unit 13 ~~is~~ being added to the tracking error signal to make the tracking error signal during the reading operation be based on the Vref. When the Voffread is regarded as a reference level during the reading operation, the Ofe2~Ofe5 shown in figure 10 are offsets which are caused by the gain change from the reading operation to the writing operation.